

Title (en)  
Hybrid circuit having a two-wire/four-wire converting function.

Title (de)  
Hybridschaltung mit einer Zweidraht-Vierdrahtumwandlungsfunktion.

Title (fr)  
Circuit hybride avec fonction convertisseuse deux fils-quatre fils.

Publication  
**EP 0467163 A1 19920122 (EN)**

Application  
**EP 91111117 A 19910704**

Priority  
JP 17733990 A 19900706

Abstract (en)  
A hybrid circuit includes a two-wire/four-wire conversion unit (11) for forming an interface between a two-wire line and a four-wire line, and a digital balancing unit (19,21,22,24,25,26) for canceling a return echo passing through an echo return route including the conversion unit. The digital balancing unit includes fourth parts. The first part (26) determines values of elements of a ladder type circuit composed of resistors and capacitors. The ladder type circuit (25) corresponds to an original equivalent circuit having an impedance obtained by viewing the two-wire line from the conversion unit. The second part (25) generates an impedance function of the original equivalent circuit in the form of a z function in accordance with a bilinear transform using an over-sampling frequency. The third part (21, 22) generates filter coefficients of a digital filter by inserting the impedance function into a transfer function of the echo return route. The fourth part (19) generates, from a signal transferred via the signal receiving terminal, an echo cancel signal by the digital filter having the filter coefficients generated by the third part and cancels the return echo by the echo cancel signal. <IMAGE> <IMAGE>

IPC 1-7  
**H04B 3/03; H04B 3/23**

IPC 8 full level  
**H03H 17/00** (2006.01); **H03H 17/02** (2006.01); **H03H 21/00** (2006.01); **H04B 1/58** (2006.01); **H04B 3/23** (2006.01)

CPC (source: EP US)  
**H04B 1/586** (2013.01 - EP US); **H04B 3/23** (2013.01 - EP US); **H04B 3/238** (2013.01 - EP US)

Citation (search report)  
• [A] CH 656271 A5 19860613 - INT STANDARD ELECTRIC CORP  
• [A] US 4787080 A 19881122 - YAMAKIDO KAZUO [JP], et al  
• [A] EP 0315191 A1 19890510 - NEC CORP [JP]

Cited by  
US6061444A; EP1548951A1; EP0708537A4; US5859907A; EP1213847A4; EP1548991A3; US7564324B2; US7180998B2

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